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AUTHOR Majsterek, David J.
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ABSTRACT

A study examined the performance on the Kaufman Assessment Battery for Children (K-ABC) for first grade students from a rural northwestern school who had received reading instruction via a structured, phonics-based reading program. Specifically, the study compared the performance of (1) three students scheduled for retention because of poor reading progress, (2) three students matched on ability with the retention group by their first grade teachers but reading acceptably, and (3) a random sample of five average readers. All students completed the K-ABC, an individually administered aptitude test that assesses sequential and simultaneous processing ability as well as academic achievement. Results showed that students who had difficulty with reading tended to perform more poorly on the K-ABC than did average readers. The findings suggest that educators need to consider adapting primary reading instruction in relation to cognitive task performance. (The paper contains 21 references and several tables of data.) (FL)

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K-ABC Sequential Processing Characteristics of Reading-Retained First Graders: Preliminary Data

David J. Majsterek

Bowling Green State University

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Abstract

Performance on the K-ABC (Kaufman & Kaufman, 1983) was compared for groups of first graders who had received reading instruction via a structured, phonics-oriented, reading program (DISTAR, Engleman & Bruner, 1984). Three small groups were compared: (a) students scheduled for retention because of poor reading progress (n = 3); (b) students matched on ability by their first grade teachers but reading acceptably (n = 3); and (c) a random sample of average readers (n = 5). The sequential processing composite on the K-ABC was significantly below the simultaneous processing composite only for the retention group. The randomly selected average readers scored significantly higher than both matched groups on sequential processing. These preliminary data suggest further research to consider adapting primary reading instruction in relation to cognitive task performance.

K-ABC Sequential Processing of Retained First Grade Readers Taught with a Structured Phonics Program: Preliminary Data

Recommendations have been made for research designed to explore homogeneous subgroups of reading retarded (Applebee, 1971), dyslexic (Boder, 1973) and learning disabled (LD) students (Torgesen, 1982). In a review of subtype research, McKinney (1984) concluded that studies demonstrate the feasibility of a subgrouping orientation. Focusing on neuropsychological (Lewandowski, 1985), behavioral (Speece, McKinney, & Applebaum, 1985), and cognitive processing (Lyon, 1985) subtype characteristics of disabled readers may provide insight into how instruction can be managed more effectively.

Nowhere is the need for identifying learning disabled readers (LDR) subtypes greater than in beginning reading instruction. Since reading is the principal academic difficulty confronting LD students (Deshler, Schumaker, Lenz, & Ellis, 1984; Sartain, 1976), screening for potential reading difficulties

makes preventive sense. However, identification of primary LDR poses an assessment dilemma. Learning-to-read difficulties which identify LDR primary students are not unlike those encountered by typical beginning readers. The LDR student becomes apparent due to a persistent reading failure in the framework of effective teaching, a process which is contingent on the passage of valuable instructional time. Waiting may result in a student-perceived inability to keep up with classmates. Therefore, a goal of early screening is the matching of individual learning characteristics to the demands of the existing reading program during an optimal learning period.

LDR Subtype Research

A study by Hooper and Hynd (1986) compared the performance of normal and dyslexic readers (grades 2 to 6) on the Kaufman Assessment Battery for Children (Kaufman & Kaufman, 1983). This study indicated significant differences between groups on the cognitive subtests of Hand Movements, Number Recall, Word Order, and Matrix Analogies, favoring the normal readers.

Average readers in the study performed significantly better on the Sequential and Achievement factors of the K-ABC but not on the Simultaneous factors. Data which suggest that LDR students are characterized by poorer sequential processing have been provided elsewhere (Hooper & Hynd, 1985). Likewise, Bayliss and Livesey (1985) found that a dysphonetic (c.f. Boder, 1973) LDR subgroup drew less on serial (and more on spatial) ordering when confronted with an experimental memory task. This strategy contrasted with a more serial ordering tendency of average readers. Mann and Liberman (1985), in a study of Kindergarteners (followed through first grade), found that word-string memory was a good predictor of reading failure. Whereas good and average readers improved in their ability to recall strings of nonrhyming words, the poor readers continued to perform poorly in first grade, growing further behind their peers. Mann and Liberman (1985) suggested that this information about high risk Kindergarteners may facilitate preventive efforts.

The effectiveness of instructional intervention along these lines was evaluated in a study conducted by

Lyon, Stewart, and Freedman (1982). A subtype of a larger group of LDR students was identified based on poor auditory-receptive and -expressive language. The subgroup (ages 6.5 to 9 years old) was divided into two segments with one group being taught using a synthetic phonics program and the other, a combination program of contextual and structural analysis, sight word, and analytical phonics. A pre- and posttest, measuring reading of single words, indicated that the latter teaching method was a more effective intervention for the previously identified LDR subgroup. Lyon concluded that the best application of reinforcement principles and superior sequencing of presentations may not guarantee reading success "unless a systematic analysis of the interface between learner characteristics and task demands are carried out" (1985, p. 34).

Cognitive processing performance of LDR students has recently received more increased scrutiny. Simultaneous and successive processes have been described as components of mental ability in terms of information processing theory (Das, Kirby, & Jarman, 1975). Das (1984) proposed that higher mental

abilities are organized both dynamically and functionally along simultaneous and successive lines. A person's ability to integrate information is shaped by how the input information is personally organized. Although all persons are able to order information in different ways, lack of awareness, existing habits, inattention, etc. may foster inappropriate matching of processing to specific tasks. Individual differences in the initial reading process can be conceived of as a reflection of simultaneous and successive processing coupled with the a cognitive awareness (metacognition) of which process best suits the task.

Of interest in the Lyon et al. (1982) study were the diagnostic characteristics of the LDR subgroup selected for the intervention phase. The subgroup had performed more poorly on the sequential-type tasks of auditory memory, as measured on the Detroit Test of Learning Aptitude (Baker & Leland, 1967), and sound blending, as measured on the ITPA (Kirk, McCarthy, & Kirk, 1968). Although other poor subtest performance characterized the Lyon et al. (1982) subgroup, the sequential nature of the auditory memory and sound

blending subtests resemble the processing skills which appear to be necessary for primary-age phonic skill mastery. Therefore, the present study sought to evaluate if students, scheduled for retention in first grade, primarily because of reading failure in a more structured phonics program, would distinguish themselves on the sequential composite of the K-ABC. Specifically, would the performance of a non-promoted group of readers resemble that of the students identified by Lyon et. al. (1982) who benefitted less from a synthetic phonics program. Since all students under consideration for the present study had participated in the DISTAR Reading Mastery program (Englemann & Bruner, 1984) in both Kindergarten and first grade, it was felt that students who failed reading following this structured and well-sequenced presentation method would be likely candidates for remedial reading instruction.

It was anticipated that students who had failed with the structured phonics approach would be identified based on their poorer performance on the sequential processing component of the K-ABC. If

deficient sequential processing was implicated in the study, subsequent work in analyzing various sequential test-tasks which may add to earlier diagnosis may be warranted. Further, affirmation of the hypothesis would tentatively question the appropriateness of routinely using phonics oriented reading programs for LDR students, especially in primary grades.

Method

Subjects

Students selected for the study were drawn from two first grades located in an elementary school in a rural town (population 5000) in a Northwestern state. No minority groups were represented. Two boys and one girl were selected because they were the only students scheduled for retention in first grade, mainly due to reading failure at this level. The three retention students were described by their teachers as struggling in the low reading group. All students were taught reading using SRA's Reading Mastery 1 in Kindergarten and Reading Mastery 2 in first grade (Englemann & Bruner, 1984.) The low reading group had completed

almost 75 percent of Reading Mastery 2. Both first grade teachers were asked to collectively select three students from their low reading group who were the same sex as the retention group students and who, they felt, "matched the retention group on general ability but were reading at an acceptable level." This "loose" matching on ability was selected because of time constraints. However, it was anticipated that K-ABC composite mental ability scores would provide comparative data for the matched groups. A second comparison group of six average readers from the middle reading group (4 boys and 2 girls) was randomly drawn. The middle reading group had completed between 15-20 more lessons in Reading Mastery 2. Of this last group, one male student was later withdrawn from the study because the evaluating psychologist felt that the K-ABC test results were invalid due to an "unwillingness to participate" during the testing situation. All students in the study were white, middle class, never retained, and were not presently considered potential candidates for special education placement. Age range for the students was 6.10 to 7.6 years old. Mean ages

for the groups were: 7.1 yrs., retention group; 7.1 yrs., matched group; and 7.0 yrs, random group.

Instrument

The K-ABC is an individually administered aptitude test for children ranging in age from 2 1/2 to 12 1/2 years. Subtests were designed to assess sequential and simultaneous processing along with academic achievement. Simultaneous processing is assessed by the following subtests: Gestalt Closure, Triangles, Matrix Analogies, Spatial Memory, and Photo Series. Subtests of the K-ABC designed to measure sequential processing are Hand Movements, Number Recall, and Word Order. Sequential refers to the processing of information in a serial or temporal manner. Simultaneous, on the other hand, "demands a gestalt-like, frequently spatial, integration of stimuli to solve problems with maximum efficiency" (Kaufman & Kaufman, 1983, p.2).

K-ABC correlational data between both simultaneous and sequential processing and the achievement factor on the test were in the range of +.64 to +.67 for the

former and +.60 to +.67 for the latter. Based on these similar intertest correlations it was felt that both simultaneous and the sequential factors were equally related to academic achievement.

Procedure

All students were administered the K-ABC during the closing two weeks of the 1985-86 school year by a school psychologist. The decision to retain students had been made prior to informing either teachers or parents of the proposed study. Letters requesting permission for participation were sent home at the same time for all students. Comparison of student performance on the sequential processing, simultaneous processing, and composite score was performed using a between-within ANOVA for unequal groups.

Results

Mean scores and standard deviations for the three groups are presented in Table 1. Both the retention group and the matched group scored below the randomly selected group of average readers on the sequential

processing composite with the retention group earning the lowest sequential composite (see Figure 1). As

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Insert Table 1 and Figure 1 about here

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indicated in Table 1, students selected to be in the ability matched group of readers were like the retention group in composite performance on the K-ABC. The ANOVA results (see Table 2) indicated a groups X subtest significant difference F (4,16) = 3.050, p <.05.

Insert Table 2 about here

Because of its conservative properties, the Scheffe method was used to explore scale score mean differences. Whereas the randomly selected group scored significantly higher than the matched groups on the Sequential Processing Composite, only the retention group's Sequential Processing Composite score was significantly below their scores on the Simultaneous

Processing Composite $p < .05$, $F_{ev(.05)} = 6.02$ for df = 4, 16.

Based on significant findings on the initial ANOVA, a post hoc analysis of sequential processing subtests was conducted using a between-within ANOVA (see Table 3).

Insert Table 3 and Table 4 about here

Table 4, containing subtest scaled scores means and standard deviations for the groups, indicates that average readers' performance was superior to the matched groups on all three subtests. On two sequential processing subtests (Word Order and Number Recall) the retention group scored below the other promotion groups. Results of the ANOVA indicated a significant difference between groups F (2,16) = 5.768, $p < .05$ on the subtests. The Scheffe method was used for a pairwise comparison of group means. The more conservative nature of the this method, however, resulted in no significant differences between groups.

Discussion

Because of the adopted reading curriculum in Kindergarten and first grade, the students in the study had a structured phonics reading program which is based on effective teaching principles for nearly two full years. The DISTAR Reading Mastery program also focuses on left to right progression and sound blending at the outset. However, in spite of ample and structured attention to decoding principles, three students were failing. In accord with standard practice, the retention students would probably come to the attention of a prereferral committee. Therefore, identifying characteristics that these students might collectively exhibit appeared justified as a source of information for future study and possible curriculum considerations.

In line with the projected course of events and the findings of the study, two questions deserve attention. First, "How did reading success relate to K-ABC performance for the primary students in the study?" The results support the view that pupils who have difficulty with reading tend to perform more poorly on the K-ABC sequential processing composite

than average readers (Hooper & Hynd, 1986). It is interesting to note that the non-retention (low reading) group also scored significantly below the randomly drawn group of (average reading) pupils. Longitudinal information on the matched group would aid in determining if the retention group was only a subset of the similarly functioning non-retained low readers. However, since only the retention group had performed significantly poorer on sequential processing compared to simultaneous processing on the K-ABC, further study of this performance pattern appears justified.

Answering the second related question, "Can a processing weakness be identified through screening?" is more complex. Research examining how sequential processing on a screening device at the beginning of the primary grades may relate to later reading performance seems indicated. The present work adds to the body of information cited at the outset which associates sequential processing with reading failure. That is, lower scores on tasks defined as sequential (e.g., Number Recall and Word Order) tended to be associated with the primary reading-retention

candidates who had been enrolled in a highly effective phonics-based program (DISTAR). However, whether the construct of deficient sequential processing caused reading failure for students taught using a phonics program is not implied. In fact, a recent study by Shinn-Strieker (1986) suggested that LD students are not the only ones who exhibit specific cognitive organizational styles. Rather, it is suggested that teaching reading using a predominantly phonics oriented approach to all primary children warrants further consideration as the work of Lyon et. al. (1982) suggested.

To summarize, these data are only preliminary although they do partially corroborate studies which indicate a poor sequential processing ability for students having difficulty with readings. It is suggested that research exploring intraindividual comparison of subtest performance on the K-ABC may provide added insight into early identifiable characteristics of high risk primary readers. Examination of the different manifestations of the sequential/simultaneous processing construct may yield

some direction to the early detection of readers who have difficulty learning through a more phonetic approach.

Finally, the present study is not to be interpreted as a support for a more holistic approach to reading for primary students. Rather, it attempts to address the range of individual needs of learners who are less than successful at an early meeting with the schools. Teachers armed with an awareness of student differences would be better equipped to address the issue of literacy at an age when patterns for reading success may be extremely malleable.

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Table 1

Factor Means and Standard Deviations on the K-ABC for Retained (N = 3), Ability-matched (N = 3), and Average (N = 5) First-grade Readers.

	Retained Grp.		Matched Grp.		Average Grp.	
K-ABC Factors	Mean	SD	Mean	SD	Mean	SD
Sequential	91.0	3.5	95.0	10.8	109.6	6.9
Simultaneous	104.3	4.0	101.0	5.6	102.6	10.3
Composite	99.0	3.6	98.3	8.1	105.8	6.5

Note. Factor scores have a mean of 100 and a standard deviation of 15.

Table 2

Between-Within Groups Analysis of Variance

Source	df	SS	F
Between Subjects			
Groups (A)	2	430.855	2.151
Error between	8	801.111	
Within Subjects			
Processing (B)	2	89.194	1.470
A x B	4	370.180	3.050*
Error within	16	485.422	

*p .05.

Table 3

Between-Within Groups Analysis of Variance

Source	df	SS	F
Between Subjects			
Groups (A)	2	48.003	5.768*
Error between	8	33.289	
Within Subjects			
Subtests (B)	2	.781	.340
A x B	4	22.202	2.419
Error within	16	36.711	

*p .05.

Table 4

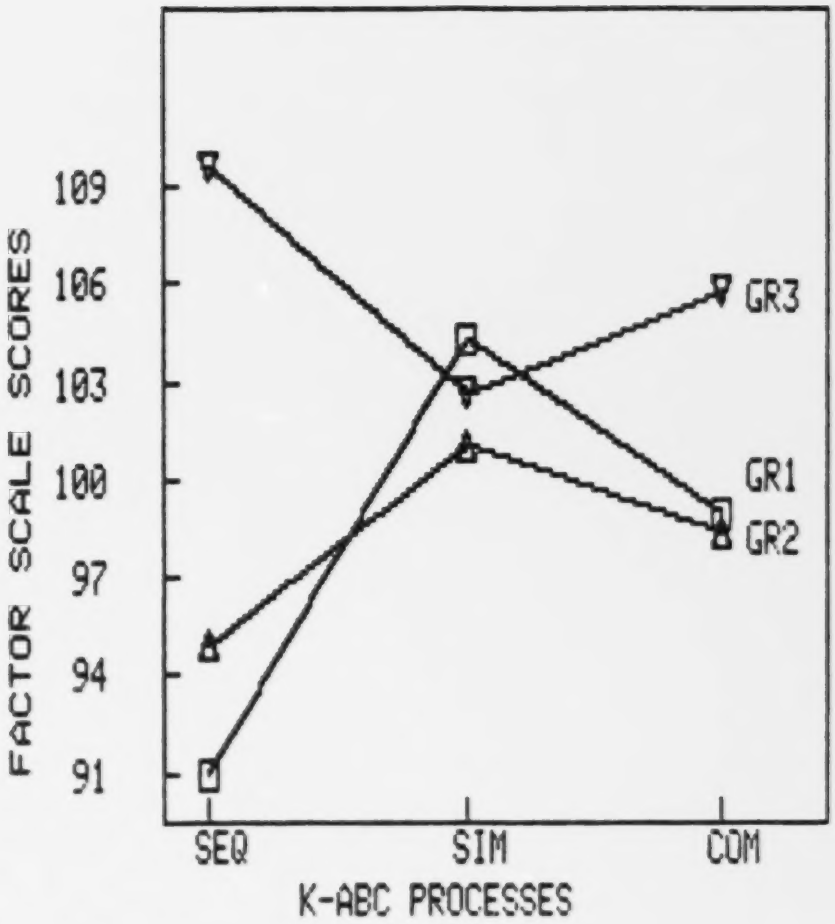
Sequential Subtest Means and Standard Deviations on the K-ABC for Retained (N = 3), Ability-matched (N = 3), and Average (N = 5) First-grade Readers.

	Retained Grp.		Matched Grp.		Average Grp.	
Sequential Subtests	Mean	SD	Mean	SD	Mean	SD
Hand Movements	10.3	1.5	8.0	2.0	12.0	.7
Number Recall	8.0	0.0	10.0	1.7	11.2	2.4
Word Order	7.7	1.2	9.7	3.2	11.4	.9

Note. Subtest scores have an mean of 10 and a standard deviation of 3.

Figure Caption

Figure 1. Sequential, simultaneous, and composite processes scaled scores for first-grade retained and matched low reading group students and average reading group students.


FACTOR SCALE SCORES
109
106
103
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SEQ
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K-ABC PROCESSES
GR3
GR1
GR2